

Colorado Department of Transportation
Scope of Work for Culvert and Minor Structure Inspections

I. GENERAL

The goal of this project is to inspect structures and minor structures owned by the Colorado Department of Transportation (CDOT). These minor structures will range in size from 48 inches in diameter to twenty feet in length. The Colorado Department of Transportation will be referred to as “the state” hereinafter in this scope of work (scope).

The purpose of this contract is to conduct culvert and minor structure inspections in accordance with the requirements of the National Bridge Inspection Standards (NBIS) and to report the findings to the state. The structure inspection shall be referred to as “the work” henceforth in this Scope.

It is anticipated that yearly task orders will be written to this contract for a period of four years.

II. DEFINITIONS

- A. **AASHTO** – American Association of State Highway and Transportation Officials.
- B. **ELECTRONIC DATA FILES** - Electronic files containing inventory and inspection data for structures and minor structures in the project manager specified version of Pontis AASHTOWARE, or other database format, specified by the project manager.
- C. **ENGINEER** – CDOT Staff Bridge Branch Manager or designee.
- D. **FHWA** – Federal Highway Administration.
- E. **FY** – Fiscal Year
- F. **NHS** – National Highway System.
- G. **PEI** – Pontis Element Inspection.
- H. **SI&A** – Structure Inv^entory and Appraisal form. An inventory and appraisal form found within the Pontis AASHTOWARE inspection module that contains information about a culvert or minor structure.
- I. **STRAHNET** – Strategic Highway Network
- J. **TEMPORARY CULVERT OR MINOR STRUCTURE** – A culvert or minor structure with temporary shoring or temporary repairs or a structure erected to maintain traffic, for the short term, pending permanent repair or replacement.

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III. INSPECTION STANDARDS

The work shall be carried out in accordance with the following documents and revisions thereto:

- A. CDOT Pontis Bridge Inspection Manual
- B. Bridge Inspection Reference Manual
- C. Culvert Inspection Manual (Report No. FHWA-IP-86-2)
- D. Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (Report No. FHWA-PD-96-0010)
- E. Underwater Inspection of Bridges (Report No. FHWA-DP-80-1)

IV. CONSULTANT QUALIFICATIONS

The consulting firm shall be pre-qualified to conduct bridge inspection work for the state of Colorado, Department of Transportation.

The individual in charge of the organizational unit, in charge of the inspection team, and the culvert inspectors, shall meet the qualifications as stated in the Code of Federal Regulations, 23 CFR, 650.307.

V. PROJECT MANAGEMENT AND COORDINATION

The project manager for this task order is:

Jeff Anderson, P.E.
Bridge Inspection Engineer
Colorado Department of Transportation
4201 East Arkansas Ave.
Room 107
Denver, Colorado 80222
(303) 757-9188

VI. PROJECT LOCATION

The structures to be inspected will be listed within the individual task orders. It is anticipated that all the culverts and minor structures will be inspected within the four-year contract period.

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VII. PROJECT DURATION

- A. The work for this task order shall commence on the date specified in the notice to proceed.
- B. Completion is defined as (1) having submitted all culvert reports in the required format to the project manager for review, and (2) the project manager having reviewed and approved the inspection reports.

VIII. CONSULTANT RESPONSIBILITY

- A. The consultant shall be responsible for the complete, timely inspection and reporting of all structures identified in individual task orders.
- B. The consultant shall follow the procedures specified in Appendix A of the Scope when a critical culvert condition is encountered.
- C. The consultant shall submit completed inspection reports to the project manager.
- D. The consultant shall conduct the work in accordance with all governing safety rules and regulations applicable to the work.

IX. INSPECTION REQUIREMENTS

- A. All structure coding items shall be completed per the requirements of the NBIS and CDOT in accordance with the following:
 - 1. The FHWA manual *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, December 1995 (Federal Coding Guide), except that English Units shall be recorded,
 - 2. The CDOT Structure Inventory Coding Guide, and
 - 3. The CDOT Pontis Bridge Inspection Coding Guide (only numeric values are necessary on the PEI form for Items 58, 59, 60, 61, 62, 71, and 72. Comments for those items are not necessary. The condition states and comments for the Pontis elements applicable to a culvert shall be reported on the PEI forms according to the CDOT Pontis Bridge Inspection Coding Guide) and Exhibit A.
- B. The consultant shall meet with each maintenance coordinator prior to beginning work in the maintenance section. This meeting is to identify themselves to the coordinator, to learn of critical structures to be inspected prior to others in the inventory, to present their plan of action to the coordinator, to determine any

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traffic control needs, and to obtain information pertinent to the inspection such as plans, maps, etc.

- C. A minimum of three digital color photographs are required for each structure. For culverts, one photograph shall show the roadway above the structure, looking in the direction of inventory, one photograph shall show the structure inlet, and the third photo shall show the outlet of the structure. For minor bridges, one photograph shall show the roadway above the structure, looking in the direction of inventory, one photograph shall show the elevation view, and the third photo shall show the superstructure from the underside of the bridge. Digital cameras shall be a minimum of 2 megapixel resolution capabilities. The photos shall be stored and submitted on a compact disk.
- D. Supplemental photographs and sketches shall be completed to give a clear understanding and documentation of distressed conditions.
- E. The PEI condition states and comments and the SI&A items shall be reported with the Pontis report approved by the project manager. The PEI and SI&A information shall be revised, if necessary, to reflect the actual elements, quantities, comments and items found in the structure.
- F. The consultant shall immediately inform the project manager via e-mail whenever the following conditions are found:
 - 1. Scour of over 2 feet at structure inlets or outlets.
 - 2. Structural problems discovered during the inspection process.

The notice shall specifically identify the problem being reported, the location of the problem, and the recommended action to alleviate the problem. The recommended action may include, but is not limited to, monitoring, load restrictions, closure, a brief description of a repair, or a recommendation for a hydraulic evaluation and structural analysis of the structure.

- G. Completed inspection reports shall be submitted to the project manager within 30 days after completing the work.

X. UNDERWATER INSPECTIONS

Underwater inspections shall consist of any appropriate method to evaluate structures below the waterline. The method of investigation shall be left to the consultant for determining structure conditions in underwater situations.

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XI. SCOUR ANALYSIS/REPORT

No scour analysis shall be performed for this inspection project other than probing. If a scour problem is noted during the inspection, the problem shall be noted and described in Pontis element 361 – Scour Smart-flag. If in the process of pulling plans to aid in establishing an inventory, the consultant finds hydraulic information within those plans, the information shall be noted in the “bridge notes”. Such information would include the following:

1. Item113C Area of opening
2. Item113D Channel slope through the opening
3. Item113E Maximum estimated depth of flow
4. Item113G Angle of attack on the culvert
5. Item113H Wetted perimeter
6. Item113I Local scour depth predicted by HEC-18 methods
7. Item113J Manning’s *n*
8. Item 113K Flow rate (Q) through culvert
9. Item113M Scour Watch (Y/N)

XII. WORK SEQUENCE AND WORK FLOW

1. Structures that are plugged shall be noted and reported to the contract administrator or his designee. The inspection team shall complete all inventory and inspection items possible, and in their report, recommend what further inspection is needed and what action should be taken to allow further inspection.
2. Structures that require traffic control will be noted and reported to the project manager or his designee. The consultant will inspect these structures once traffic control arrangements have been made. The consultant shall provide for all necessary traffic control.
3. Structures that required special inspection equipment shall be noted and reported to the project manager. The consultant will organize the special equipment (i.e. video logging, cleaning equipment etc.) work in such a way as to minimize equipment rental time.

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XIV. REPORTING

- A. The consultant shall use the version of the ASSHTOware Pontis program specified by the project manager for reporting Pontis inspection and NBIS inventory information. The consultant shall provide final reports to the project manager in both PDF and PDI formats. Photos shall be provided on compact disks.
- B. Each inspected culvert shall be locate using GPS longitudes and latitudes. GPS equipment shall be accurate enough to locate the left side of the culvert (looking ahead route) within ten feet. The right side GPS reading shall be recorded within the bridge inspection notes of the Pontis inspection module. For minor bridges, one GPS reading shall be taken at the left shoulder at Abutment 1. Elevations of both inlets and outlets shall be noted at culverts.
- C. The consultant shall provide a written signature by the inspectors responsible for the work, along with a list of applicable structures that were inspected.
- D. As necessary, supplemental sketches, photos, plans, etc. shall be prepared and included as part of the final report to document structure condition.
- E. If sketches are developed electronically, copies of the electronic files shall be submitted to the Project manager on a compact disk.
- F. Pontis data interchange files (PDI) shall be submitted on a compact disk in the Pontis AASHTOWARE version specified by the Project manager and compatible with IBM PC microcomputer systems. Alternately, electronic files may be e-mailed.

XV. SERVICES AND MATERIALS AVAILABLE FROM CDOT

The following services and materials will be available to the consultant from CDOT:

- A. CDOT Structure Inventory Coding Guide, CDOT Pontis Bridge Inspection Manual, and Pontis User's Manual.
- B. CDOT Staff will be available for reference on coding, computer use, or other related concerns. CDOT Staff will provide the current version of Pontis for use on consultant computers. Licensing for this software is covered under the CDOT annual licensing agreement with AASHTO.

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- C. Edit features within Pontis AASHTOWARE will be used for adding structures to the database and editing data on existing structures.
- D. Pontis installation compact disk. Note; database query software, Infomaker7, is not available from the state. The consultant will have to purchase the software package, if desired.
- E. Current culverts and minor structures electronic database.

XVI. FINAL REVIEW

- A. The project manager will review electronic submittals for completeness and consistency. Noted problems will be returned to the consultant for review and for corrections.
- B. The project manager or his designee may accompany the consultant during field inspections or visit the office of the consultant to review procedures and to verify billings.

XVII. METHOD OF PAYMENT

Task orders will be setup to pay the consultant for the work on a cost plus fixed fee basis as negotiated prior to each annual notice to proceed.

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APPENDIX A
IDENTIFICATION OF CRITICAL CULVERT CONDITIONS

- A. **PURPOSE:** This appendix establishes the procedures of the Colorado Department of Transportation, Staff Bridge Branch regarding the general subject of critical inspection findings. The term “critical” as contained within these procedures is intended to mean a condition involving grave uncertainty, i.e., a hazardous or precarious condition.

Critical inspection findings are deficiencies that are such as to compromise the ability of the structure to function as designed. Critical inspection findings(CIF) require immediate identification, notification, correction, and follow-up.

- B. **TYPICAL CONDITIONS:** The following represents typical but not all inclusive inspection findings that are considered to be a CIF:

1. **Concrete Structures**

- a. Concrete slabs with over 30% loss in primary moment steel.
- b. Slabs sheared at the ends to the extent that displacement has occurred.
- c. Collapsed joints or severe invert deterioration.

2. **Steel Structures**

- a. Corrosion in floors resulting in perforations of the metal.
- b. Displacements in tops.
- c. Collapsed seams or joints.

3. **General – All Structures**

- a. Scour which has caused vertical or horizontal displacement, or has the potential to cause such displacement.

- C. It shall be the responsibility of the inspection team leader, performing an inspection, to be alert for conditions other than identified above which may also be considered a CIF. Such a finding shall be reported to the state upon return from the inspection or, if deemed necessary, immediately by telephone or in person.

- D. The criticality of the deficiency will result in one or more of the following actions with an importance described as follows:

1. Immediate closure of the roadway due to collapsing fill.
2. Restricted traffic usage.
3. Urgent repairs to be accomplished within a period to be determined by the project manager.
4. The consultant shall propose repairs or remedial actions to be taken, to the project manager.

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E. Special Actions Required of the Inspection Team Leader

1. The team leader shall notify the state by phone, or in person, when the actions identified as 1 through 3 above are appropriate. He should describe the unsafe condition and recommend immediate steps to be taken to insure safety to the traveling public.
2. The team leader shall provide written confirmation to the owner for any action required by 1 above. Copies of the confirmation with supporting documentation shall be sent to the project manager.

NOTE:

The consultant will need to pick up the following information directly from the CDOT:

- **Names and phone numbers of CDOT maintenance coordinators**
- **Lists of critical structures identified by previous contract.**

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APPENDIX B
BILLING SUPPORT DOCUMENT

Billing and support documents, when completed after the negotiation phase, to be attached as part of this task order as Appendix B.